

# Montana State Hemp Program

## Procedure Guidance for Sample Collection, Sample Prep and Delivery

August 1, 2019 - V6

### Authority

Title 80, Chapter 18-101 - 111, Montana Code Annotated, the Administrative Rules of Montana, Chapter 19.101 - 106, and the Agriculture Improvement Act of 2018.

### Scope

To document the proper procedures for the sampling of hemp plants for the tolerance level of THC within Montana's State Hemp Program to ensure compliance with relevant state and federal regulations.

Hemp growing conditions in Montana vary tremendously, including acreage, varieties, plant densities and irrigation. Additionally, the geographic size of Montana makes it difficult to sample such a large crop in a short period of time. As such, the department will implement more than one option of sampling hemp for THC, depending on the circumstances of variety, harvest timing, resources, weather, acreage, plant density and travel.

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## 1. Definitions

- (1) Field - means a contiguous area not separated by any fence, drainage, road or waterway, regardless of Township, Range or Section.
- (2) Grower Submitted Sample - means a sample collected by the license holder or a representative of the license holder in accordance with the official procedures outlined herein.
- (3) Lab - means the Department's Analytical Lab (MSU, McCall Hall, Bozeman, MT).
- (4) Lot - means a contiguous or immediate adjoining area of a field or fields, greenhouse, or indoor growing structure containing the same variety of hemp throughout the area and having a harvest date within 4-weeks.
- (5) Lot ID - The official Lot ID will be the Lot/field ID number as recorded in the hemp database, regardless if the grower has a separate Lot ID. Lots must be tracked by the grower from planting through harvest and until the plant is no longer in a raw, unaltered state. If applicable, the Grower Lot ID may change after harvest as long as it is traceable to the previous Lot ID.
- (6) Official sample - means a composite, representative sample of hemp plants or plant parts from a designated Lot collected in accordance with official procedures as outlined herein.
- (7) Post-Harvest Sample - means a sample collected of hemp material in a homogenous form (e.g., biomass, inflorescences, intact-plant, root, etc.) from a specific Lot after harvest and prior to processing.
- (8) Pre-Harvest Sample - means a sample collected from hemp plants while the plant is growing
- (9) Processing - means heating, mixing, grinding, separating, extracting, cutting, freezing or otherwise physically or chemically altering hemp plants or plant parts from a raw, unaltered state.
- (10) Split Sample - means one of two equivalent portions of a whole composite sample identified as such with the same information as the official sample, collected at the same time in the same manner and randomly divided after the composite is collected.
- (11) Sub-sample - consist of 1 bud randomly selected.
- (12) THC - means Total  $\Delta^9$ -THC

## 2. Varietal Category Testing and Testing Frequency

The department will prioritize sampling based on complaints of non-compliance and the Category of the variety. The goal is to conduct random sampling of:

- Category A varieties at 10% of growers
- Category B varieties at 20% of growers
- Category C varieties at 100% of growers

### 3. Sampling Overview

- (1) The department may require the planting date and the estimated harvest date prior to issuance of the Production license certificate so it can estimate timing and work load requirements.
- (2) Official samples collected by the department will be collected within 4 weeks of harvest. Postharvest samples will be collected as soon as possible after harvest to allow for efficient marketing by the grower.
- (3) The inspector will give the grower at least 24-hour, preferably 48-hour notice of the inspection date to set up time and location.
- (4) The license holder or an authorized representative is encouraged to be present at the growing site during inspection and be available by phone prior to or during the inspection. The landowner on record can be an authorized representative if granted by the license holder.
- (5) Inspectors will be provided with complete and unrestricted access to all industrial hemp and other cannabis plants, whether growing or harvested, and all land, buildings, and other structures used for the cultivation and storage of all industrial hemp and other cannabis plants.
- (6) Harvested lots must maintain their identity, not be commingled and be traceable until official results indicate the legality of the lot.
- (7) The department's goal is to notify license holders of official sample test results within 7-business days of sampling. The test results will determine the eligibility to transport or process the harvested materials.

### 4. Equipment

The equipment required for conducting an inspection and the collection of hemp samples are as follows:

- Coveralls (single use)
- Vinyl gloves
- Pruning shears
- Composite sample collection container (washable bag for carrying shears and sub-sample when collecting the sample)
- Composite sample bags (breathable paper, approximately 12"x 6"x4")
- Tamper-proof security bags for shipping the sample
- Permanent black marker for sample ID
- Alcohol wipes
- Document of Inspection
- Hemp Sample Collection Report/Sample Receipt form
- Field Summary form
- Sample Log/Chain-of-Custody form
- Transport cooler
- Shipping coolers
- Ice-packs

Sanitation of equipment is as follows:

- Clean all sampling equipment with appropriate disinfectant after each composite sample.
- Change gloves after each composite sample and properly dispose of used gloves.
- Properly dispose of single-use coveralls after each inspection.

## 5. Sampling Protocol

Prior to beginning sampling, the inspector must review with the license holder all grow locations, Lots and Lot IDs, Variety(s) and Category(s) to determine the number of lots to sample. The inspector must consider all grow locations, even if across county or district lines, of the license holder before determining which lots require sampling. If a Lot in a different District requires sampling, coordinate with the inspector in that area. Any form information that can be completed prior to sample collection should be done at the planning stage at the office or with the grower.

Each variety must be sampled separately. However, the variety category testing frequency should be considered; all Category A and B varieties do not require sampling, but the department intends to officially sample each Category C variety. Different lots of the same variety and the same license holder do not have to be sampled but can be at the discretion of the inspector if he/she observes differing varietal characteristics or differing growing conditions. The location(s), variety(s) and materials sampled are determined by the inspector with information provided by the license holder. All samples are property of the department and will be properly disposed of by the lab according to laboratory procedures.

### Pre-harvest Sampling

Depending on plant spacing, the department will utilize two separate pre-harvest sampling protocols designated as Field Crop and Horticultural. See examples for the number of sub-samples to collect under Appendix A - Hypergeometric Table.

- (1) Field Crop (0.05 acre or more planted at approximately 15 - 30 lbs seed per acre)
  - a. From review of map, field size and growing conditions, determine the sub-sample rate within the lot.
  - b. If sampling a non-registered field, log the latitude/longitude of the composite sample starting point.
  - c. Sample the field in an 'M' pattern beginning in the lower corner of the field and ending in the opposite lower corner. Multiple 'M' patterns may be required if a lot contains more than one field.
    - i. If the plant density is too thick to navigate the 'M' pattern across a large Lot, collect the sub-samples around the perimeter of the field by navigating into the field as far as possible at random but equal distances around the field. Record the sampling procedure conducted if different than the normal 'M' pattern.
  - d. Collect 30 random sub-samples at uniform distances throughout the field pattern.

- i. The composite sample should consist of material from similarly mature female plants only. It should not contain material from male, dead, diseased or injured plants.
    - ii. A sub-sample is collected by randomly cutting 1 bud from each single plant sampled. The bud collected should not be from the top 3" of the plant.
  - e. Deposit the 30 sub-samples into the composite sample paper bag.
  - f. Using a permanent marker, ID the composite sample bag and fold over.
  - g. Place the composite sample bag into an evidence security bag and ID with permanent marker following procedures outlined herein.
  - h. Place the security bag in transport cooler with ice.
- (2) Horticultural (any size field or greenhouse where plants are grown in pots or the in-ground spacing is greater than 18" apart)
- a. For areas 1/10 acre (50'x100') or larger, use the Field Crop sampling method above.
  - b. Log the latitude/longitude of the sampled location.
  - c. For lots or areas less than 50'x100', use the Hypergeometric Table in Appendix A to determine the number of sub-samples to collect. Use a similar 'M' pattern to sample the growing area.
  - d. Collect the appropriate number of random sub-samples at uniform distances throughout the sampling pattern.
    - i. The composite sample should consist of material from similarly mature female plants only. It should not contain material from male, dead, diseased or injured plants.
    - ii. A sub-sample is collected by randomly cutting 1 bud from each single plant sampled. The buds should be collected from a different height on each plant, but should not be collected from the top 3" of the plant.
  - e. Deposit the sub-samples into the composite sample paper bag.
  - f. Using a permanent marker, ID the composite sample bag and fold over.
  - g. Place the composite sample bag into an evidence security bag and ID with permanent marker following procedures outlined herein.
  - h. Place the security bag in transport cooler with ice.
- (3) For operations that have **15 plants or less in a single Lot**, collect 1 or more buds as necessary from each plant, but no less than a minimum of 15 buds, randomly from the available plants.
- (4) The absolute minimum sample size the labs needs for testing is 15 grams, on a dry matter basis.

### Post-harvest Sampling

For hemp grain and seed sampling, follow normal grain and seed sampling procedures as outlined in those respective program manuals. For all other forms of harvested hemp materials, the overall procedure is as outlined here. The exceptions are noted in the Sub-sample Procedures section below.

- (1) Review the Lot and Lot size to assure the materials to be sampled are known and uniform.
- (2) Determine the appropriate number of sub-samples according to the Hypergeometric Table.

- (3) Log the latitude/longitude of the collection site.
- (4) The composite sample should consist of homogenous material. It should not contain material from diseased or injured plants.
- (5) Collect the appropriate number of random sub-samples at uniform distances throughout the Lot as outlined below. \*
- (6) Deposit the appropriate number of sub-samples into the composite sample paper bag.
- (7) Using a permanent marker, ID the composite sample bag and fold over.
- (8) Place the composite sample bag into an evidence security bag and ID with permanent marker following procedures outlined herein.
- (9) Place the security bag in transport cooler with ice.

#### \* Sub-sample Procedures

- (1) Biomass (e.g., baled)
  - a. Use a hay coring device rather than hand sampling whenever possible. For sampling baled hemp, at least 20 cores (one per bale) should be taken as sub-samples, then combined into a composite sample per lot. Bales within a lot must be sampled randomly. A coring device with an inside diameter greater than 3/8" must be used.
  - b. When sampling round bales, drill horizontally to a depth of 12 to 24" into the curved side of the bale aiming towards the center of the bale.
  - c. To sample rectangular bales, center the coring device on the end of the bale and drill horizontally into the bale to a depth of 12 to 18".
  - d. If sampling by hand, pull material from the bale and take equal amounts from the surface and interior. Avoid stripping off leafy or tender materials.
  - e. Obtain a large enough sample to ensure the sample is representative of the Lot (approximately 2 lbs.).
- (2) Buds (dry)
  - a. Grab a single bud by hand.
- (3) Flowers (with multiple buds)
  - a. Randomly cut 1 bud from each flower. The cuttings should not be collected from the top 3" of the plant.
- (4) Plants (hanging dry) harvested from a horticultural setting
  - a. Randomly cut 1 bud from each single plant. The cuttings should not be collected from the top 3" of the plant.
- (5) Roots
  - a. Grab a single root by hand.
- (6) Stalks
  - a. Grab a single stalk by hand.

## **6. Sample Identification**

Label the composite sample container with a sample ID. The sample ID shall include:

- the four-digit sequential inspection number with the preceding 'H-',
- the sample letter designation, and
- the 2-digit number designating the year

Example: "H-0001-A-19"

## **7. Grower Submitted Samples**

Growers are encouraged to collect hemp samples and have testing completed to ensure their variety does not exceed the THC tolerance level. However, it is not required, and results are not required to be submitted to the department. Growers should use the recommended sampling protocol outlined within this document and use ISO 17025 accredited labs to assure consistency of test results.

## **8. Sample Prep, Storage and Delivery**

The moisture content of samples will vary depending on growing conditions, maturity of plant and whether collection is conducted pre- or post-harvest. Sample moisture can affect sample integrity. As such, samples must be placed in coolers on ice as soon as possible after the composite sample is collected and prior to leaving the inspection. Multiple samples can be contained and shipped in the same cooler.

### Storage

Any time samples are stored prior to sending to the lab, keep samples in a locked vehicle or locked room in a cooler with ice.

### Delivery to the Lab

The cooler and enclosed sample(s) will be sent to the MDA Analytical Lab. Hand-delivery is the preferred method of delivery. However, mailed samples are allowed. Mailed samples must be sent by FedEx using the department's FedEx account. Mail samples should:

- be sent overnight (if possible), or 2-day delivery at a minimum,
- not be mailed on Friday (not reach destination on the weekend),
- use the FedEx tracking system,
- be placed in standard FedEx overnight packaging,
- not require insurance or self-certification for mailing hemp,
- utilize temperature-control methods to assure sample environment does not exceed 140°F.

### Mailed Samples

The samples will be mailed to the Analytical Lab in a shipping cooler with freshly frozen ice packs. The shipping cooler must be sealed. The Sample Collection Report, the Chain of Custody and the return shipping label (so the lab can return the cooler) must be placed inside the cooler in a plastic bag.

## **9. Chain of Custody**

Regardless of storage or delivery options, Chain of Custody measures must be maintained, and the proper documentation completed throughout the process. Proper Chain of Custody measures include:

- Tamper-proof security packaging
- Proper sample identification
- Samples contained in locked vehicle, office space or storage building when not occupied

## **10. Sample Forms and Reporting**

For specific instructions on completing the forms required for sampling hemp, see the designated Form SOPs. The 4 forms required are:

- Hemp Document of Inspection (Form DOI)
- Hemp Sample Collection Report/Sample Receipt (Form CR/SR)
- Hemp Inspection Field Summary (Form HFS)
- Hemp Lot/Field Map (Form HLM)
- Hemp Sample Log / Chain of Custody (Form SL/CoC)

The Hemp DOI form is used to document the inspectional observations and findings of license holder's operation and to serve as license holder's acknowledgement of the inspection information.

The Field Summary form is to document the operation's field/Lot's locations, size, variety, category, and its registration status.

The Sample Collection Report/Sample Receipt form is to document the samples collected, to initiate the chain of custody for the samples, serve as a Collection Report to be sent with the sample(s) to the lab, and serve as acknowledgement of the license holder that the sample collection was conducted.

The Hemp Lot Map form is available only if needed for documenting a new field that is not already registered.

The Hemp SL/CoC form documents the tracking and custody of sample(s) from the collection site to the lab.

Each form must be completed accurately, and copies must be provided to interested parties as outlined in the SOPs. Electronic copies of these documents and the data within will be maintained on department servers.

## 11. Appendices

### Appendix A

Hypergeometric Table for Random Sampling

Total number of inspectional units:	Randomly select this number of units to inspect:
1-13	Inspect all units
14-15	13
16-17	14
18-19	15
20-22	16
23-25	17
26-28	18
29-32	19
33-38	20
39-44	21
45-53	22
54-65	23
66-82	24
83-108	25
109-157	26
158-271	27
272-885	28
886-200,000	29

Examples (assuming only one variety):

- A one tenth acre field planted at field crop spacing (25 lbs. per acre) has approximately 67,500 plants (inspectional units). A composite sample would include **30 sub-samples (buds)**.
- A one-acre field planted at horticultural spacing (3' x 5') has approximately 3,000 plants (inspectional units). A composite sample would include **30 sub-samples**.
- A one tenth acre field planted at horticultural spacing (3' x 5') may have approximately 300 plants (inspectional units). A composite sample would include **28 sub-samples**.
- A 20' x 40' greenhouse (800 sq. ft.) planted at horticultural spacing (3' x 5') may have approximately 55 plants (inspectional units). A composite sample would include **23 sub-samples**.
- For operations that have **15 plants or less in a single Lot**, collect 1 or more buds as necessary from each plant, but no less than a **minimum of 15 sub-samples**, randomly from the available plants.


**H-0001**

Notice of Inspection / Sample Receipt is hereby given pursuant to the Montana Alternative Agricultural Crops Act.

License Holder Name		Inspection Date	
Business Name		License Number	
Business Location		County	
Landowner Name		Inspection Location	

Inspection Type: (circle one)	Routine	Requested	Follow-up	Investigatory
<b>Inspection Checklist</b> – (Circle Y or N and provide comments as necessary) Corrective actions for the <u>inspectee</u> are noted in the Inspection Comments.				
• Grower is licensed	Y / N			
• All growing locations are registered	Y / N			
• Planting seed was properly labeled	Y / N			
• Seed provided by licensed Dealers	Y / N			

Inspection / Field Comments:

	This inspection revealed deficiencies of the inspectee:			
	This inspection revealed deficiencies of an entity other than the inspectee:			
Inspector's Name			Inspector's Name	
Inspector's Signature			Inspector's Signature	
Date			Date	

## Appendix C - Hemp Field Summary form

### Hemp Inspection Field Summary

License Holder Name: \_\_\_\_\_

Inspection Number: H - \_\_\_\_\_

License Number: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Field / Lot ID	Grower Field ID	On-site Lat/Long	Lot Size	Variety	Category	Field Reg.	Harvested Date (If already harvested)	Sampled (Check if Yes)
1		Lat Long	ac. sq'			Yes No		
2		Lat Long	ac. sq'			Yes No		
3		Lat Long	ac. sq'			Yes No		
4		Lat Long	ac. sq'			Yes No		
5		Lat Long	ac. sq'			Yes No		
6		Lat Long	ac. sq'			Yes No		
7		Lat Long	ac. sq'			Yes No		
8		Lat Long	ac. sq'			Yes No		
9		Lat Long	ac. sq'			Yes No		
10		Lat Long	ac. sq'			Yes No		
11		Lat Long	ac. sq'			Yes No		
12		Lat Long	ac. sq'			Yes No		

Inspector's Initials:

Inspector's Initials:

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# Appendix D - Hemp Sample Collection Report/Sample Receipt form

## Hemp Inspection Sample Collection Report / Sample Receipt

License Holder Name: \_\_\_\_\_ Inspection Number: **H** - \_\_\_\_\_

License Number: \_\_\_\_\_ Inspection Date: \_\_\_\_\_


Sample ID	THC Analysis	Number of Sub-samples	Comments	Pre-harvest Sample	Post-harvest Sample	Sample Reason	Field / Lot ID
<b>A</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>B</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>C</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>D</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>E</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>F</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>G</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>H</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>I</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>J</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>K</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	
<b>L</b>	Yes No			___ Field ___ Hort	Biomass ___ Flowers Buds ___ Whole Plants Stalks ___ Other	___ Routine ___ Survey ___ Complaint	

Inspector's Initials:

Inspector's Initials:

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Appendix E - Hemp Lot/Field Map form

	<b>Hemp Lot / Field Map</b>	Inspection #: H-_____ License #: _____
<b>MONTANA DEPARTMENT OF AGRICULTURE</b> AGRICULTURAL SCIENCES DIVISION PO Box 200201 – Helena, MT 59620 Phone: (406) 444-3730		
<hr/>		
<p>Draw a diagram showing relative field shape, field characteristics, the sampling pattern and any distinguishable field references.</p>		
Field / Lot ID: _____ Field Irrigation: _____ Plant Spacing: _____ Acres: _____		
<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">+</div>	<div style="border: 1px solid black; width: 650px; height: 450px; margin: 10px auto; position: relative;"><div style="position: absolute; top: 10px; right: 10px; text-align: center;">↑ <b>N</b></div></div>	<div style="border: 1px solid black; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">□</div>
Inspector Signature: _____		Date: _____

## Appendix F - Sample Log / Chain of Custody form



### Hemp Sample Log / Chain-of-Custody Report

AGRICULTURAL SCIENCES DIVISION  
PO Box 200201  
Helena, MT 59620-0201  
(406) 444-3730 – agr@mt.gov

#### Sample Log

Lab Number	Inspection Number	Sample ID	District	Comments	License Holder	
					Field / Lot ID	
General Comments						

Number of samples submitted: \_\_\_\_

#### Chain of Custody

	Name	Signature	Date	Time of Possession		Time Relinquished	
Inspector 1			Ship Date:				am pm
Inspector 2					am pm		am pm
Transporter 1					am pm		am pm
Transporter 2					am pm		am pm
Receiver / Lab					am pm		